

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), November 2016

B. Tech.-ECE, EE, CSE, CSE-IBM-BD, CSE-IBM-IS, Semester-I

Roll No.....

EE-101: Electrical & Electronics Engineering

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1 Objective type multiple choice questions (10 questions @ 1 mark)

10

- i. Dependent voltage and current sources are (a) Unidirectional (b) output is dependent on input (c) independent of any other network variable (d) all of these
- ii. Star-delta transformation is employed to simplify circuit elements connected in (a) Series (b) Parallel (c) series parallel combinations (d) none of these
- iii. Which of the following theorems helps in simplifying computations when the load across a circuit is varying? (a) Superposition (b) Norton's (c) Thevenin's (d) Maximum power transfer
- iv. In applying the superposition theorem, (a) the sources are considered one at a time with all others replaced by their internal resistance (b) the sources are considered one at a time with all others replaced by their internal impedance (c) all sources are considered simultaneously (d) all sources are considered independently.
- v. The reactance offered by a capacitor to alternating current of frequency 50 Hz is 20 Ohm, if frequency is increased to 100 Hz, reactance becomes (a) 2.5 ohm (b) 5 ohm (c) 10 ohm (d) 15 ohm.
- vi. When an R-L-C series circuit is in resonance, the current through the circuit is determined by (a) V/X_L (b) V/R (c) V/X_C (d) none of these.
- vii. In Single Phase Transformer, The Primary Current and Primary Voltage is 4.55 Amp. and 11kV respectively. The Rating of the transformer would be: (a) 150 kVA (b) 100 kVA (c) 86 kVA (d) 50 kVA.
- viii. A Transformer _____. (a) Changes dc to AC (b) Changes ac to DC (c) Steps up or down DC Voltages & Current (d) Steps up or down AC Voltages & Current
- ix. When a diode is forward biased, the voltage across it : (a) is directly proportional to the source voltage (b) is directly proportional to the current (c) is inversely proportional to the current (d) remains approximately the same
- x. The element that has the biggest size in a transistor is: (a) Collector (b) base (c) Emitter (d) collector-base-junction

Q.2 Short answer type questions (4 questions @ 2.5 marks)

10

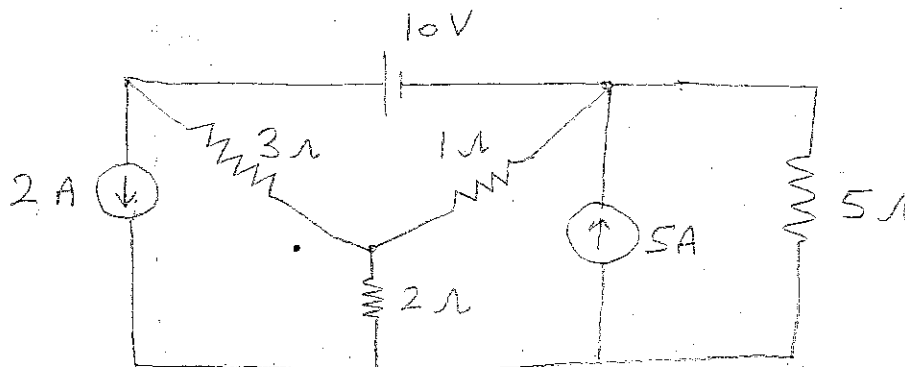
- i. State and explain Kirchhoff's current and voltage laws.
- ii. What are the differences between DC circuit and AC circuit?
- iii. What is power factor? Discuss the practical importance of power factor.
- iv. What are the applications of step-up and step-down transformers?

Q.3A Explain the nodal voltage method for solving a network. How are the nodal equations written?

05

Q.3B Find the power delivered by the 5 Amp. Current source in the circuit shown in fig. by using the nodal method.

05

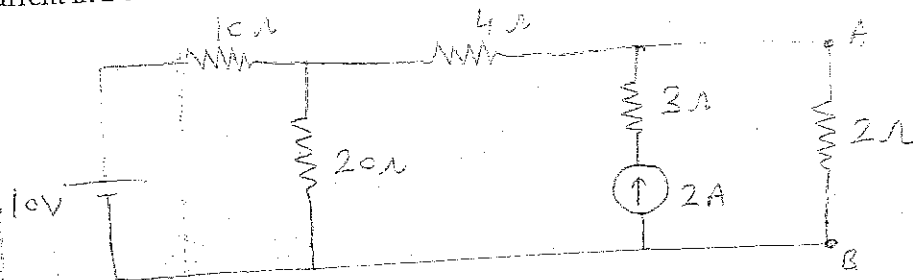


Q.4A State and explain Norton's theorem. Show that this theorem is just the converse of Thevenin's theorem.

05

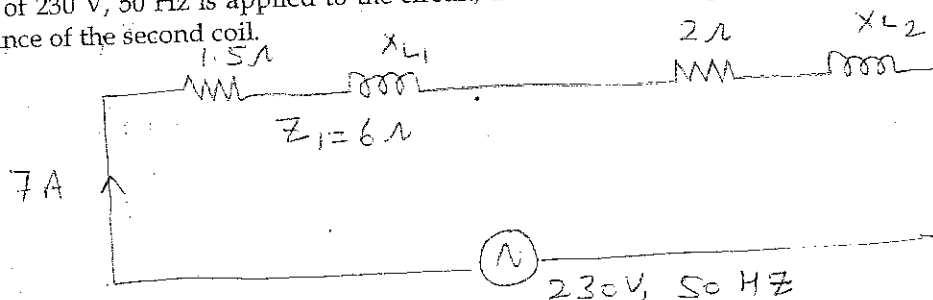
4B Calculate current in 2 ohm resistor in the network shown in fig. using Thevenin's theorem.

05



Q.5A Derive the expression for impedance, phase angle, power factor, current, voltage, reactance, apparent power, real power and reactive power for R-L series circuit. 05

Q.5B A coil of resistance 1.5 ohm and impedance 6 ohm is placed in series with a second coil of resistance 2 ohm. When a voltage of 230 V, 50 Hz is applied to the circuit, the current flowing through the circuit is 7 Amp. Find the inductance of the second coil. 05



Q.6A Explain the construction and principle of operation of a DC generator with neat sketch. 05

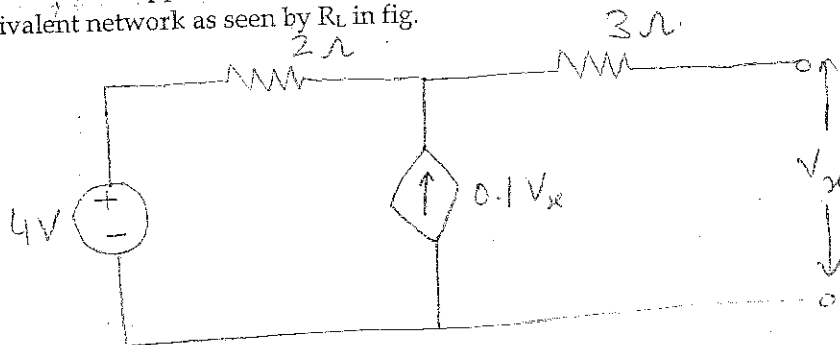
Q.6B A coil having a resistance of 10 ohm and an inductance of 125 mH is connected in series with a 60 μF capacitor across a 120 V supply. At what frequency does resonance occur? Find the current flowing at the resonant frequency. 05

OR 05

Q.6B Describe the construction details of transformer and also explain the principle of operation. 05

Q.7A Explain the operation of centre tapped full-wave rectifier with neat diagram. 05

Q.7B Obtain Norton's equivalent network as seen by R_L in fig. 05



OR

Q.7B Describe the working of a P-N junction diode with neat diagrams. Also explain its V-I characteristics. 05

Q.8 A three-phase balanced delta-connected load is connected to a three-phase, 400 V, 50 Hz supply. It draws a line current of 34.64 Amp. At 0.8 power factor lagging. Determine resistance and inductance of each branch. Further, determine the power drawn by each phase and draw the phasor diagram. 10

Q.9A A resistor of 20 ohm, Inductor of 0.05 H and a capacitor of 50 μF are connected in series. Supply voltage of 230V, 50 Hz is connected across the series combination. Calculate the following: (a) Impedance (b) Current drawn by the circuit (c) Phase difference and power factor, and (d) Active and reactive power consumed by the circuit. (e) Draw the phasor diagram. 10

Q.9B The secondary of a 500 kVA, 4400/500 V, 50 Hz, single-phase transformer has 500 turns. Determine (i) emf per turn (ii) primary turns (iii) Primary and secondary full load current (iv) Maximum flux. 10

OR

Q.9B Two Wattmeters are connected to measure three-phase power for star-connected load reads 3 kW and 1 kW. The line current is 10 Amp. Calculate (a) line and phase voltage (b) resistance and reactance per phase. 10